THE TALON

Volume 14, Issue #1 March 2014

OPENING REMARKS

No matter how long you have instructed there is always something new to learn and always something that you can improve upon. The TALON has a long tradition at HT -18 for highlighting areas that may need additional clarification or emphasis. This issue of the TALON is no different. This quarter our focus is on weather patterns and aircraft performance. This winter we have seen a weather pattern that can only be described as completely unpredictable. From subzero freezing and icing conditions one day to balmy 70 degree temps another, proper preflight planning and understanding how these conditions affect helicopter performance will aid your understanding of performance related phenomena and make for a better helicopter pilot. With temperature variations, come variations in DA and aircraft performance. These factors, if not anticipated or briefed, can lead to loss of situational awareness or wrong anticipation during maneuvers. In addition to variations in temps comes the annual time change. We "spring Forward" on March 9. Your clock is not the only clock that needs to be reset. Setting your internal clock is just as important. When adjusting to the new time change, ensure you are getting proper rest and ensure that you are mentally and physically prepared to complete your assigned mission. This is all about proper preflight planning.

Throughout this issue, the squadron stage managers identify current trends in weather adaptation and focus on techniques to reduce variance in instruction. We hope that this issue of the TALON begins a healthy discussion on weather, the change of seasons, and how these changes may affect all of us in the advanced rotary syllabus. Proper preflight planning, understanding and communication can keep a crew from making poor decisions when circumstances and conditions begin to deteriorate. Your input is critical.

Proper communication and the ability to never stop learning from others and yourself, is a key to staying ahead of the aircraft and anticipating the weather. We are doing an excellent job Eagles. Keep leading from the front!

- LCDR Scott "Scotty T" Thompson -

Inside This Issue

1 CAT I - Weather Considerations

2 CAT II - Seasonal Changes

3 CAT II - Instruments and Weather

4 CAT III - Transient Torque

5 CAT IV - Fatigue and Weather

CAT I - Weather Considerations

CAT I

As I was thumbing through some old Stan Grams (precursor to the Talon) I came to the conclusion not much has changed in almost 40 years. Here's a quick excerpt from the Cat I Leader April 1974.

"It's the dog days of summer again and the DA has that nasty habit of rising above 2500 feet quicker than the Crash Crew responds to a routine aircraft shutdown. You've heard it a million times before: Don't let the student put you in a position that you're not comfortable with. Also, most aircraft have air conditioners that work adequately. When you get one that doesn't, watch out for both the student, and yourself. The amount of verbal

abuse that a student receives is usually directly proportional to the core temperature of the instructor. Stay cool!!"

Density Altitude

Air, like liquids and other gases, is a fluid. Because it is a fluid, it flows and changes shape under pressure. Air is said to be "thin" at high altitudes; that is, there are fewer molecules per cubic foot of air at 10,000 feet than at sea level. Take a stack of blankets; the bottom blanket is under the pressure of all blankets above it. As a result of this pressure, the bottom blanket may be squeezed down until it is only one-tenth as bulky as the fluffy blanket on top. There is still just as much wool in the bottom blanket as there is in the one on top, but the wool in the bottom blanket is 10 times more dense. Think of the bottom blanket as low density altitude and the top blanket as high density altitude. Take this concept and apply it to a column of air. Now, place your helicopter in the lower column of air on a cool February day. Your helicopter wants to fly because the dense air increases the amount of lift on the rotor blades. As we enter the summer months we will get an increase in temperature, and moisture content. These conditions will contribute to a high density altitude and lessen helicopter performance particularly in hovering flight. Helicopter performance is reduced because the thinner air at high density altitudes reduces the amount of lift on the rotor blades. .

We are all responsible for knowing the density altitude in the working area and the degree to which it affects the aircraft performance. With the hot months coming make sure you review RWOP 3.5 AUTOROTATIONS AND SIMULATED EMERGENCIES

Dehydration

There is limited attention given to it. Most pilots overlook it. Some shrug it off. While others simply don't know about its effects in the cockpit. The problem? Pilot dehydration. Most pilots are unaware of its devastating effects and symptoms, which can increase the risk of aircraft incidents and accidents, even during a mildly warm day.

I remember a time when it was a norm for SAR Pilots to purposely dehydrate during duty days to prevent the need to urinate during long missions. Looking back it was probably a horrible idea and possible inhibited our ability to perform at peak performance. As a CAT I instructor hydration is a crucial element that will aid in your ability to properly train and remain safe. Hovering for an hour and a half on a 90 degree summer day in a mildly cooled TH-57 will not only test your patience but put you in a state of dehydration, fatigue, and a position to make mistakes. When fluid losses equal four percent of body weight, there is a five to 10 percent drop in overall performance, which can last up to four hours.

So how do you avoid dehydration in the cockpit? You'll need to permanently attach yourself to a water bottle and drink from it regularly. The *Federal Air Surgeon Bulletin* suggests drinking cool, 40-degree Fahrenheit water before feeling thirsty. This will help you stay ahead of the game, keeping you hydrated before the "thirst mechanism" sets in.

Carry a CamelBak if you have one; this is a good way to stay hydrated on a four hour hop with only a hot gas for a break.

Stay hydrated my friends.

LT Dewey Lawson

CAT II - Seasonal Changes

A map study provides the pilot with an advance look at the terrain features that may be encountered when operating at TERF altitudes, potential ambush positions, or channelizing terrain the enemy may utilize. Consider assembling as many different maps of the area of operations as possible. At a minimum, the two different maps we will use are the joint operational graphic (JOG) - 1:250,000 scale; and topographic - 1:50,000 scale. Additionally, satellite imagery, road maps, and cultural maps will increase the awareness of the aircrew. When requesting satellite imagery through the squadron S-2 (Intelligence Department) requests must be made far enough in advance to be available for detailed planning.

Conducting a good map study will help you to reach your terminal area or objective area on time, and alleviate cockpit workload during the high workload portion of the mission. At the objective area, attention from all crew members will be required for increased radio communications, working the sensor (FLIR), and objective area mechanics. A good map study prior to the flight will alleviate the work load required to navigate and aid in hitting your time on target or L Hour.

We will now discuss the maps and imagery that is available to you in order to conduct a good map study.

Joint Operational Graphic - 1:250,000 Scale

The joint operational graphic (JOG) is the primary map for planning and flying the enroute portion of the mission. The map has a scale that provides a wide area of coverage, has latitude/longitude markings, and includes universal transverse Mercator (UTM) map features. The JOG map has two versions: JOG Air and JOG Ground. The JOG Air has aviation-

related information such as airport elevation, airport beacons, terrain clearance altitudes, and magnetic variation lines. The JOG Air also has the military grid reference system (MGRS) with 10,000-meter grids superimposed in blue on the map. The JOG Ground map is less cluttered (lacking aviation-specific information) and terrain contours are not shaded. We use the JOG Air to navigate the Green Route forward and reverse.

Topographic - 1:50,000 Scale

The topographic map is used to accurately locate and confirm unique map features. It serves to display, in more detail, those areas that may be difficult to interpret on the JOG. Use a 1:50,000 scale as the primary map to plan and navigate in the terminal area or objective area. We use this map to navigate the Orange and Purple Routes.

The maps available for use during planning and execution may not have the most current aviation hazards, manmade features, and other topography information that may have changed since the map was printed. There are many methods of updating your maps with more current information to help successfully navigate the route. We will discuss the use of photographic/ satellite imagery and Electronic Chum.

Photographic/Satellite Imagery

Joint Mission Planning System (JMPS) has several tools that we can use to ensure our maps have the most current information, and to perform a thorough map study during pre mission planning. After you have built your route in JMPS, you may zoom in on the map layers until you get to satellite imagery. This satellite imagery is on a scheduled update cycle, and is more current than the JOG and Topographic maps we use.

The other application within JMPS to take advantage of is Sky View. Sky View will give you a 3D sky view of your route, as you would see the ground from a particular altitude. The user can set the altitude to view the route. For NVG operations, the user can enter the percentage of illumination for the night the mission is to be flown, and view the route as it may appears on NVGs (green tint).

Google Earth is another, less official, source of imagery to update your route maps and perform a map study. In a similar manner previously discussed of Sky View in JMPS, you can zoom in to see your route of flight, and update your maps with any changes in the terrain, hydrography, vegetation, or manmade features such as roads and buildings. Common map updates are change in ponds/lakes, unimproved roads or trails, and farmers fields.

Change of Seasons

As we finish up with winter and move into spring, we must be aware of the change in vegetation and water levels of rivers, creeks, and streams. The most obvious change you will see is the change in color of the deciduous trees along rivers and creeks. During the winter months, the deciduous trees loose there leaves, making them look light brown from the air. The rest of the trees away from the rivers are primarily coniferous (Pine) and they maintain their green needles throughout the winter. This difference of color of the vegetation makes the identification of rivers and creeks very easy. As the weather warms up and the leaves grow back on the coniferous trees, the rivers become more difficult to identify.

The water levels of the rivers, creeks, and streams swell during the spring and summer months, and tend to lower in late fall and winter months. The intermittent streams that may have dried up in the winter will start to come back to life as we push into spring. These are a few seasonal considerations we must think about as we plan for low level navigation flights in the spring.

CAPT Peter "Jacko" Hughes

CAT II - Instruments and Weather

With the Winter winding down and temperatures remaining cold, many of us have become accustomed to a negative density altitude (DA) and a relatively stable airmass. For those IPs who arrived after September, this may be the only climate they know. As we progress into the Spring and Summer, temperatures, DA, and convective activity will become important factors in our flight planning. Another factor is the propensity for fog development, particularly near the water, resulting in rapidly changing visibility and extremely low ceilings. During the Back in the Saddle brief at the beginning of January, CAPT Fisher noted April, May, August and September as the transition months accruing more overtorques than any other months. The common factor is IP complacency and not considering the shifting temperatures. At sea level and 10 degrees Celsius, HIGE/HOGE at 3000 lbs is 75% and 87%, respectively. However, these numbers increase by roughly 5% moving into the summer. If the IP is not maintaining his or her defensive posture, the student may rapidly pull up collective to lift and can easily overtorque. In cruise flight, it has not been uncommon to be able to maintain 122 KIAS (Vne) at 5000' pressure altitude (Pa). As it warms up, Vne at a given Pa will decrease. Be vigilant to ensure students are calculating this appropriately during level off

checks. Please take a moment to read through the EP DA requirements as these will have an impact on engine failures while splitting at OLF Santa Rosa.

Those IPs who were around prior to August can probably to attest to how much more difficult BI and RI flights become during the warmer months. Convective turbulence will make it more difficult for students to hold altitude and airspeed. It is common for students to pull collective until leveling the VSI or regaining the desired VSI for Vertical S-1 or Oscar Patterns. Placing emphasis on torque awareness during the ORM brief and giving the students fair warning on the effects of convective turbulence will help curb some of these BI overtorques.

As the temperatures remain cool but the airmass becomes more tropical with increased humidity, fog is going to make it more difficult to get any flights off the deck. Please consider the use of the NDZ101, VFR ON-TOP canned flight plan. This is simply a recommendation as some of our IPs have frequently used this flight plan and safely completed their training events. Certainly keep in mind the expected cloud tops, and if there is a single fog layer with not additional broken or overcast layers, this may provide you a possibility to get out. However, remember to file per OPNAV which will require an alternate for most cases where the NDZ 101 is desired.

We all need to take a minute to review procedures and publications. Although we're busy, these transition months provide an optimal time to re-evaluate our procedures and knowledge to ensure we keep our crews safe.

LT Kevin "CheeEEse" Goettsche

CAT III - Transient Torque

Transient Torque… what's that? I've been flying the CH -46 and we never had to worry about that phenomenon.

The following is an excerpt from the Army Aviator's Maneuvering Flight Handbook (24 MAR 05) on transient torque.

Transient torque is a phenomenon that occurs in single rotor helicopters when lateral cyclic is applied. For conventional American helicopters where the main rotor turns counterclockwise when viewed from above, a left cyclic input will cause a temporary rise in torque and a right cyclic input will cause a temporary drop in torque.

1. Pilot makes a left cyclic input – the swashplate commands an increased blade angle of attack as each blade passes over the tail.
2. The increase in blade angle of attack causes the rotor disk to tilt left, which is felt as a left roll on the aircraft.
3. With increased lift on the rotor blades passing over the tail, comes increased drag (induced drag).
4. The increased rotor drag due to the left turn will initially try to slow the rotor, but is sensed by the ECU/DECU/FADEC. The engine will respond by delivering more torque to the rotor system in order to maintain rotor speed.

The opposite holds true for right cyclic turns, but is less pronounced. Unlike the left hand turn, in right turns blade pitch is being changed at the front of the rotor disk where induced downwash is lower, so the drag penalty is lower. Transient torque will not be as prevalent at slower airspeeds because the induced downwash distribution is nearly uniform across the rotor disk.

Five factors affect how much torque change occurs during transient torque.

1. Torque transients are proportional with the amount of power applied. The higher the torque setting when lateral cyclic inputs are made, the higher or lower the transient.
2. Rate of movement of the cyclic. The faster the rate of movement the higher the resultant torque spike.
3. Third, magnitude of cyclic displacement directly affects the torque transient. An example of worst-case scenario occurs when a pilot initiates a rapid right roll, then due to an unexpected event such as taking fire, he must break left. The transition from right cyclic applied to left cyclic applied results in a large amount of pitch change in the advancing blade, resulting in large torque transients.
4. Drag is increased or decreased proportionally with a change in velocity squared (V2). Thus, the higher the forward airspeed, the higher the torque transient that results.
5. High aircraft weight increases coning, which will make transient torque more pronounced.

Extreme caution must be used when maneuvering at near maximum torque available especially at high airspeeds. It is not uncommon to experience as much as 50% torque changes in uncompensated maneuvers with high power settings at high forward airspeeds. In these situations, the pilot must ensure that collective is reduced as left lateral cyclic is applied and increased for right cyclic inputs. Conversely, when recovering from these inputs, opposite collective inputs must be made so aircraft limitations are not exceeded.

As a good basic technique, imagine a piece of string tied between the cyclic and collective (e.g., right cyclic-collective increase/left cyclic-collective decrease). Also, inputs must be made to keep the aircraft from descending due to torque reductions, (e.g. when recovering from left cyclic inputs with collective reduced).

How does this apply to what we do here at HT-18 "C" Tactics?

Consider the following scenario: Standard summer day in North FL/LA (Lower AL): High DA, +36 degrees, GW +3,000 lbs (Naval Academy Line backer right seat), wing on F4101, CP 1-2, 100 KIAS, 200'AGL, IP demoing combat cruise position (10 degrees forward of abeam/right side, 4-5 disks). IP rapidly rolls left utilizing a large magnitude turn to demonstrate how to fix being acute. Going through the 6 o'clock position the IP notices the dreaded twice per second flash of the torquemeter, which results in a LD and Wing executing the on scene commander checklist ensuring Lead makes a safe PEL to a farmer's field.

How can we mitigate the adverse affects (over torque/ INC) of transient torque?

"Knowing is half the battle." - G.I. Joe

Anticipate it. Talk about it in the ORM brief. I like to talk about the importance of the PAC's inside scan which should include the torquemeter especially during power applications, left pedal & left cyclic inputs. The PNAC should brief all impending turns especially hard left turns (CP 7-6 Purple Route). Don't forget transient torque can happen during the roll out wings level from a stabilized hard right turn e.g. from CP 6-7.

Be a good Lead and fly 100 KIAS not 110 KIAS. Another technique for Lead is to fly no faster than whatever A/S you can make by pulling 75% (rule of thumb: Wing's torque requirement = Lead's torque + 10%. (Admin Note: A change has been submitted decreasing the F4101 Purple Route A/S from 100 KTS to 90 KTS.)

Last but not least, be a good Wing and stay in position & always be aware of the appropriate rate and magnitude of turns.

"C" Tactics Technique of the quarter: To ensure SNAs remember to pass the controls to the inboard pilot during lead change or wave offs use the mnemonic "Let's Discuss" who has the controls prior to executing the LIMA DELTA or section waveoff.

LT Andrew "Burnsides" Kirkpatrick

CAT IV - NVG Low Level VFR Navigation

Vigilant Eagle night warriors, as we shift from the winter months back into the spring, two issues become germane to NVG flying: fatigue and weather.

Fatigue

Over the winter months, SNAs and IPs have become accustomed to waking up extremely early. As the clock turns to spring, sunset will be getting later each day (about 2 min per day). Additionally, on March 9th Daylight Savings Time will again be in effect, pushing sunset and EENT to the right. Sunset will be nearly 1915 local time by the end of March, with EENT approximately 45 minutes after sunset each night. It will be incumbent upon IPs and students alike to ensure they are properly rested, and to take conscious note of the time shift and its affect over circadian rhythm disruption. IPs should be asking SNAs during their ORM brief not only whether they were afforded the required *official* crew rest, but more specifically, what time they went to bed the night prior and what time they woke up that morning. From OPNAV 3710.7U:

> *Crew rest includes free time for meals, transportation and rest and must include an opportunity for **8 hours of uninterrupted sleep time for every 24-hour period**.*

Additionally,

> *Note - **As the time continuously awake duty time exceeds 16 hours, performance efficiency begins to drop. After 18 hours, performance efficiency rapidly declines to 75 percent of effectiveness or less.** The loss of effectiveness is manifested by lapses in attention, increased reaction time, slowed information processing, decreased vigilance, and increased error frequency. Accident rates for just about every type of human activity increase after 18 hours of wakefulness, particularly during the night "circadian trough" when sleep would normally occur.*

Take note that the requirement for **sleep** does not carry a "shall" with it. For IPs, if during your ORM brief for an NVG event you discover that the SNA woke up that morning at 0600 and had no meaningful sleep since, you are not prohibited from taking that SNA flying. However, IPs must remember SNAs have minimal or no experience flying during this part of the night, and are not fully night adapted. Additionally, a good ORM discussion must take into account not only the impact of lack of sleep on your flight event, but also on that person's ability to drive home safely in the wee hours of the morning.

Those of us with families know the challenges associated with shifting your sleep cycle to accommodate a night schedule, but IPs must lead by example and reinforce to SNAs the importance of quality sleep so that we can safely accomplish the mission.

Weather

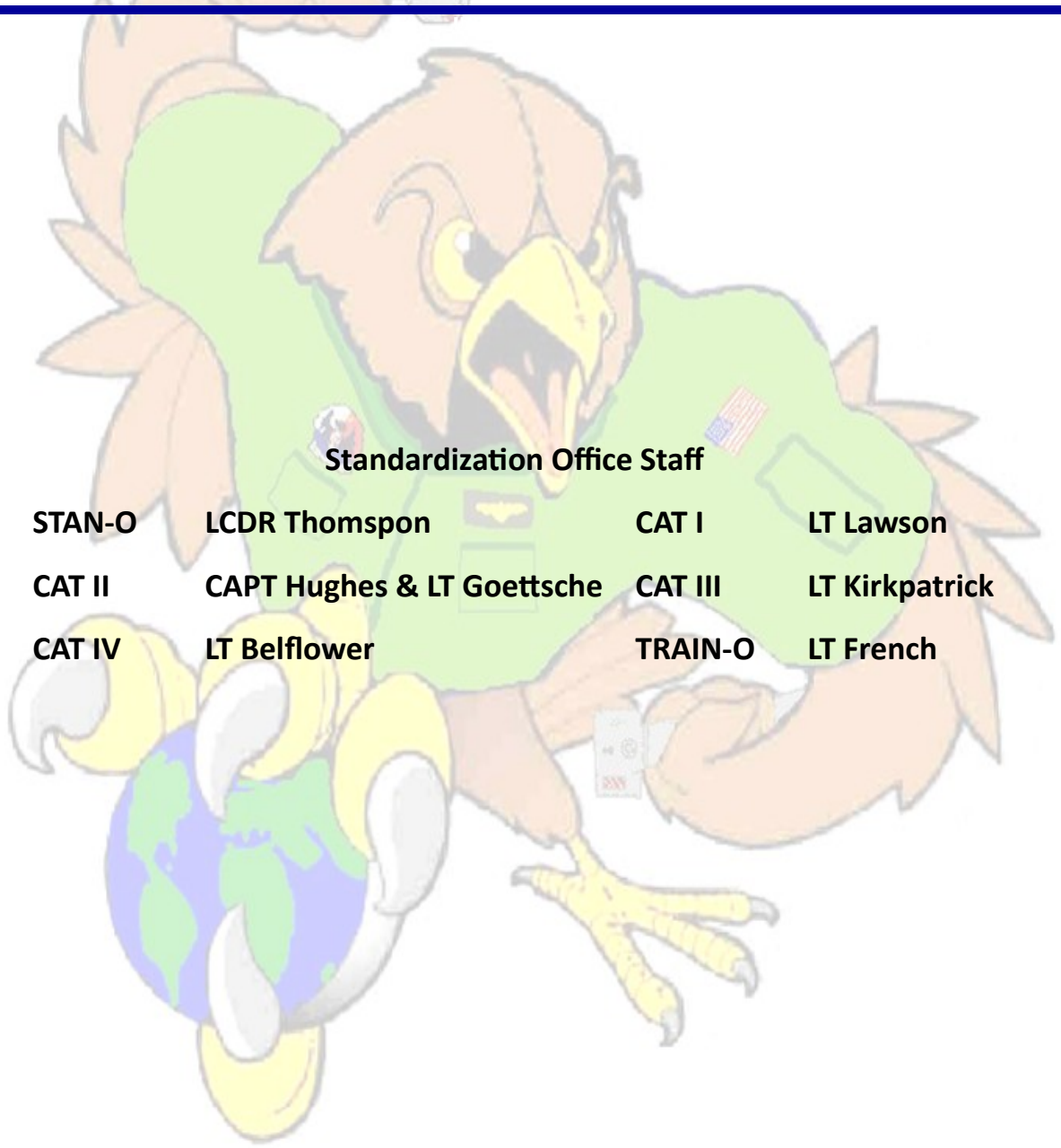
With spring rapidly approaching, the weather will again shift back to the subtropical climate we're so

accustomed to. March brings with it an increase in temperature, humidity, and dew point, as well as more frequent sunshine. March is on average the fourth wettest month of the year for Milton/Pensacola, with an increasing amount of thunderstorm activity. The combination of these factors results in an increasing frequency of radiation fog, which forms at night under clear skies with calm winds when heat absorbed by the earth's surface during the day is radiated into space. As the earth's surface continues to cool, provided a deep enough layer of moist air is present near the ground, the humidity will reach 100% and fog will form (http://www.crh.noaa.gov/jkl/?n=fog_types). The mean number of days of fog for southern Alabama in March is 15 days, the most of any month (http://www.nwas.org/digest/papers/1995/Vol19-Issue4-Jul1995/Pg10-Croft.pdf). These weather phenomena must be studied thoroughly during mission planning, and briefed accordingly. For ODOs, a reminder from the RWOP:

> *If fog is forming, and weather is forecast to fall below minimums within (1) hour, recall local area operations.*

As always, thank you for supporting the night schedule, and making the NVG stage the best part of the Advanced Helicopter syllabus!

LT Rob "Wrecks" Belflower



Standardization Office Staff

STAN-O	**LCDR Thomspon**	**CAT I**	**LT Lawson**
CAT II	**CAPT Hughes & LT Goettsche**	**CAT III**	**LT Kirkpatrick**
CAT IV	**LT Belflower**	**TRAIN-O**	**LT French**